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1951 Born in Osaka, Japan

1974 Graduated from Osaka University (Chemistry)

1979 Doctor of Engineering from Osaka University (Organometallic Chemistry)

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***** Presentation Information *****

Conference Name: Electro-Active Polymer Actuators and Devices (EAPAD) (SS04)

Conference Chair: Bar-Cohen [SS04]

Presentation title: **Reinforced Bimorph Actuators of Electroactive Polymers**

Presentation type: Oral Presentation

Abstract:

Electro-active mechanochemical systems by swelling of polymer electrolyte are promising candidate for an artificial muscle. A perfluorinated cation-exchange membrane plated with noble metals was found to bend with electric stimuli in water. A narrow strip of the plated membrane bends beyond a loop under voltage around 2 volts. With the electric stimuli, the polymer layer on the cathode expands and the layer on the anode shrinks. The bimorph-effect bends the polymer sheet, if the aspect ratio of the sheet is far from unity. However, the force of bending was not very strong. If the displacement of the cantilever actuator did not depend on the width of the strip, the force could be enhanced by extending the width of the actuator. A square sheet of the actuator does not roll well by the shape effect, but only the four corners of the sheet bend a little. A square sheet of a bimorph cantilever actuator was ribbed with fine wires of high-tension metals. An actuator 5-mm square reinforced with five ribs bent ten times larger than that without ribs. The force of the ribbed sheet actuator was almost proportional to the width.

Keywords: Electroactive Polymers, Bimorph, Soft Actuators, Reinforced, and Shape Effect.